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Abstract

Manufacturing and Installation Experience from the Heavy-Water Systems of the Ågesta Nuclear Power Plant

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The Ågesta Nuclear Power Plant (R3/Adam), which is designed for combined district heating and power generation and is located 15 miles south of Stockholm, Sweden, went critical on 17th July, 1963. The pressurized heavy-water reactor of the pressure-vessel type is fuelled with natural uranium.

The paper will present some of the experiences obtained from the design, manufacture and installation of the components in the main cooling and auxiliary heavy-water systems.

The demands for a high degree of tightness, compact structures with small heavy-water volumes and for smooth internal surfaces for the components, mostly made of stainless steel, have necessitated special designs for a number of the components. A brief survey is given in the paper of the design of the components for the reactor portion of the plant and also of the testing performed during the design stage.

The electrical equipment was tested in three successive stages, namely in the testing department of the manufacturer, in the laboratory of the main contractor and, finally, at the site after the erection had been completed. Testing prior to delivery covered practically all the equipment and comprised tests difficult to perform at site. All the cables and cable penetrations at the site were impulse tested or tested with high-voltage d.c. The correct wiring of all circuits was checked against circuit diagrams, and the functional testing of the apparatus, instruments, etc., was repeated.

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The paper deals also with the most important questions concerning the design and erection of the pipework in the main cooling system. The choice of materials and the stress analysis are some of the subjects discussed. The erection of the pipework and especially the realization of the cold springing are described. The results were checked by straingauge measurements at ambient and elevated temperatures, and information is given of the application of the strain gauges and the experiences obtained with high-temperature gauges. The measured and estimated stresses are also compared.

Stringent cleanliness requirements were observed during the manufacture and installation so as to ensure good functioning of the plant without too many disturbances during the commissioning, even though the internal cleaning of the systems after erection was to be carried out only by means of the circulation of demineralized water, i.e., without any pickling.

The paper describes how the components were cleaned during manufacture and how the clean erection work at the site was organized.

Operational experience from the plant will be presented in a separate paper at the Conference.